Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

"The history of the mathematical group-theory can be conveniently divided into three periods. The first of these extends from the beginning of mathematical history to about 1770 A.D., and may be called the *implicit period* since the group concept was then employed without being explicitly stated. The second, or *specialization period*, extends from about 1770 to about 1870. During this period the theory of substitution groups was founded as an autonomous science and the usefulness of this theory in the study of algebraic equations was emphasized. The third, or *generalization period*, extends from about 1870 to the present day, and is characterized by increased generalizations by abstraction and the explicit use of groups in each of the large domains of mathematics."]

Tohôku Mathematical Journal, volume 18, nos. 3 and 4, December, 1920: "On continuous sets of points, II" (continued) by K. Yoneyama, 205–255; "On the separation theorem for the integrals of the differential equation of the third order" by K. Ôishi, 256–260; "On the distribution of electricity on two mutually influencing spheroidal conductors" by B. Datta, 261–267; "Sur quelques propriétés relatives à certains polygones inscrits à une circonférence" by V. Thébault, 268–272; "On some characteristic properties of curves and surfaces" by S. Nakajima, 272–287; "A note on the closed convex surface" by K. Ôishi, 288–290; "An application of the orthogonal trajectory to a problem of singular solutions of ordinary differential equations of the first order" by T. Matsumoto, 291–294; "On the integral $\int_0^\pi e^x \cos r\theta \sin q\theta, \cos q\theta \, d\theta$" by T. Takeuchi, 295–296; "Über lineare Gleichungen mit unendlich vielen Variabeln" by T. Kubota, 297–301; "Akiyuki Kemmochi and his 'Equal circles on the sphere'" [in Japanese] by T. Hayashi, 302–308; "Some formulas in the theory of interpolation of many independent variables" by S. Narumi, 309–321; "On the use of a table of double entry" by T. Hayashi, 322–326; "Shorter notices and reviews, Miscellaneous notes," 327–338.

Transactions of the American Mathematical Society, volume 22, no. 1, January, 1921: "Arithmetical paraphrases" by E. T. Bell, 1–30; "The construction of algebraic correspondences between two algebraic curves" by V. Snyder and F. R. Sharpe, 31–40; "Concerning certain equicontinuous systems of curves" by R. L. Moore, 41–55; "Fundamental systems of formal modular seminvariants of the binary cubic" by W. L. G. Williams, 56–79; "A property of two $(n + 1)$-gons inscribed in a norm-curve in n-space" by H. S. White, 80–83; "Recurrent geodesics on a surface of negative curvature" by H. M. Morse, 84–100; "On the location of the roots of the jacobian of two binary forms, and of the derivative of a rational function" by J. L. Walsh, 101–116; "On functions of closest approximation" by D. Jackson, 117–128.

Transactions of the Royal Society of South Africa, Cape Town, volume 8, 1920, part 2: "Note on unimodular and other persymmetric determinants" by T. Muir, 95–101; "Note on certain determinant identities arrived at by H. v. Koch" by T. Muir, 101–105—Part 3: "Note on a sum of products which involves symmetrically the nth roots of 1" by T. Muir, 173–178; "Additional note on the resolvability of the minors of a compound determinant" by T. Muir, 229–233—Part 4: "Second note on the determinant of the sum of two circulant matrices" by T. Muir, 293–296.

PROBLEMS AND SOLUTIONS.

Edited by B. F. Finkel and Otto Dunkel.

Send all communications about Problems and Solutions to B. F. FINKEL, Springfield, Mo.

PROBLEMS FOR SOLUTION.

[N.B. The editorial work of this department would be greatly facilitated if, on sending in problems, the proposers would also enclose their solutions—*when they have them.* If a problem proposed is not original the proposer is requested *invariably* to state the fact and to give an exact reference to the source.]

2896. Proposed by the late L. G. WELD.

A circle is inscribed within a triangle. In each of the three spandrels between this circle and the vertices another circle is described; in each of the three spandrels between these last circles and the vertices another circle; and so on *ad infinitum*. Show that the ratio of the sum of the areas of all the circles to the area of the triangle is

$$\frac{\Sigma}{\Delta} = \frac{\pi}{4}\frac{\Delta}{S^2}\left[\frac{1}{\sin\frac{1}{2}A} + \frac{1}{\sin\frac{1}{2}B} + \frac{1}{\sin\frac{1}{2}C} - 2 + \sin\tfrac{1}{2}A + \sin\tfrac{1}{2}B + \sin\tfrac{1}{2}C\right].$$

2897. Proposed by PAUL CAPRON, U. S. Naval Academy.

Discuss the conditions under which the angles made by two circles on a sphere have the same measures as the distances between their poles.

2898. Proposed by J. W. CLAWSON, Ursinus College.

Four straight lines determine four triangles. It is well known that the circumcenters of these triangles lie on a circle and that the circumcircles intersect this circle in a point, called the Wallace point. It is also well known that the orthocenters of the four triangles lie on a straight line, which is perpendicular to the line on which lie the middle points of the three diagonals of the quadrilateral determined by the four given straight lines.[1]

Prove that the centroids of the four triangles lie on a parabola whose axis is parallel to the mid-diagonal line; and that the distance from the Wallace point to the mid-diagonal line is two-thirds of the distance from the Wallace point to the axis of the parabola.

2899. Proposed by NORMAN ANNING, University of Michigan.

A, B, C, and P are any four coplanar points. P describes a sextant about A when the line AP turns about A through $+60°$. Show that P moves in a closed curve when it describes sextants in succession *either* about $A, B, A, B, A, \cdots$ *or* about $A, B, C, A, B, C, \cdots$.

PROBLEMS—NOTES.

13. Professor C. N. MILLS, of Heidelberg University, Tiffin, Ohio, proposed the following problem: "A, D and C are telegraph poles at equal intervals by the side of a railroad; t_1 and t_2 are the tangents of the angles which AD and DC subtend at any point B on the road; t is the tangent of the angle which DB makes with DC. Show that $2/t = 1/t_1 - 1/t_2$." This relation may be written down at once from the familiar results[2] that $1/t = (\cot A - \cot C)/2$ where $A = \angle BAC$, $C = \angle BCA$; $1/t_1 = 2\cot B + \cot A$, where $B = \angle ABC$; and $1/t_2 = 2\cot B + \cot C$. If s_1, s_2 and s are the sines of the angles whose tangents are t_1, t_2 and t, respectively, it may be readily shown[3] that $s_1 = (a\sin B)/d$, $s_2 = (b\sin C)/d$, $s = (a\sin C)/d$, where a, b, c have the usual significance in connection with the triangle ABC, and $d = \sqrt{2a^2 + 2c^2 - b^2}$. ARC.

14. Professor I. A. BARNETT, of the University of Saskatchewan, proposed the problem: "Prove that

$$\cos\frac{\pi}{15}\cos\frac{2\pi}{15}\cos\frac{3\pi}{15}\cos\frac{4\pi}{15}\cos\frac{5\pi}{15}\cos\frac{6\pi}{15}\cos\frac{7\pi}{15} = \left(\frac{1}{2}\right)^7."$$

This result is given as example 13 on page 319 of W. E. Johnson, *Treatise on Trigonometry*, London, 1889, and as example 5 on page 119 of E. W. Hobson, *A Treatise on Plane Trigonometry*, second edition, Cambridge, 1897. The solu-

---

[1] Steiner, *Annales de Mathématiques Pures et Appliquées*, April, 1828.—EDITOR.

[2] See, for example, J. Casey, *A Treatise on Plane Trigonometry*, Dublin, 1888, pp. 174–175; S. L. Loney, *Plane Trigonometry*, Cambridge, 1893, p. 246.

[3] S. L. Loney, *l.c.*, p. 240.